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## Resolving Ionospheric E-region Modeling Challenges: The Solar Photon Flux Dependence

Joseph B. Jensen  
*Utah State University*

Jan J. Sojka  
*Utah State University*

Michael David  
*Utah State University*

Kent Tobiska  
*Utah State University*

Robert W. Schunk

Tom Woods  
*University of Colorado*

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## Authors

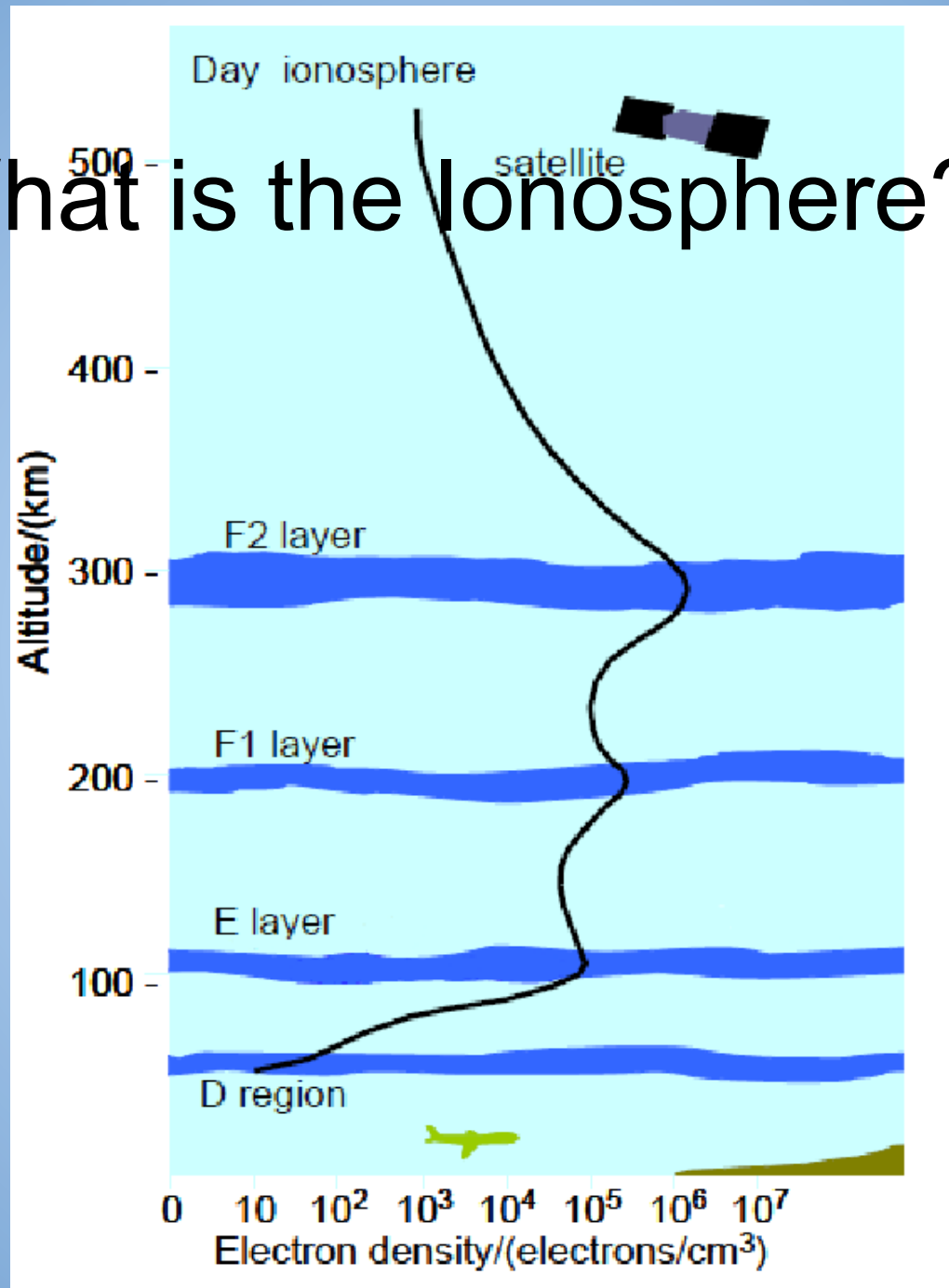
Joseph B. Jensen, Jan J. Sojka, Michael David, Kent Tobiska, Robert W. Schunk, Tom Woods, and Frank Eparvier

# Resolving Ionospheric E-region Modeling Challenges: The Solar Photon Flux Dependence

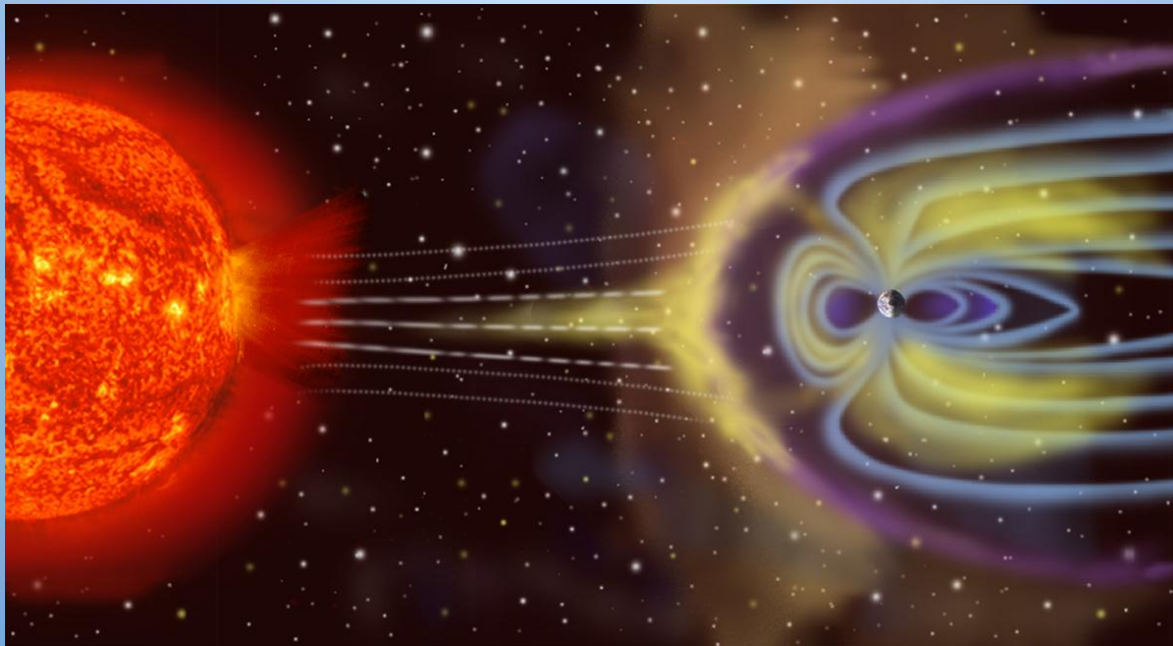
Authors:

Joseph B. Jensen, Jan J Sojka, Michael David, Kent Tobiska, Robert Schunk  
Utah State University  
Tom Woods, Frank Eparvier LASP University of Colorado Boulder

# What is the Ionosphere?



# The E-region is important because...

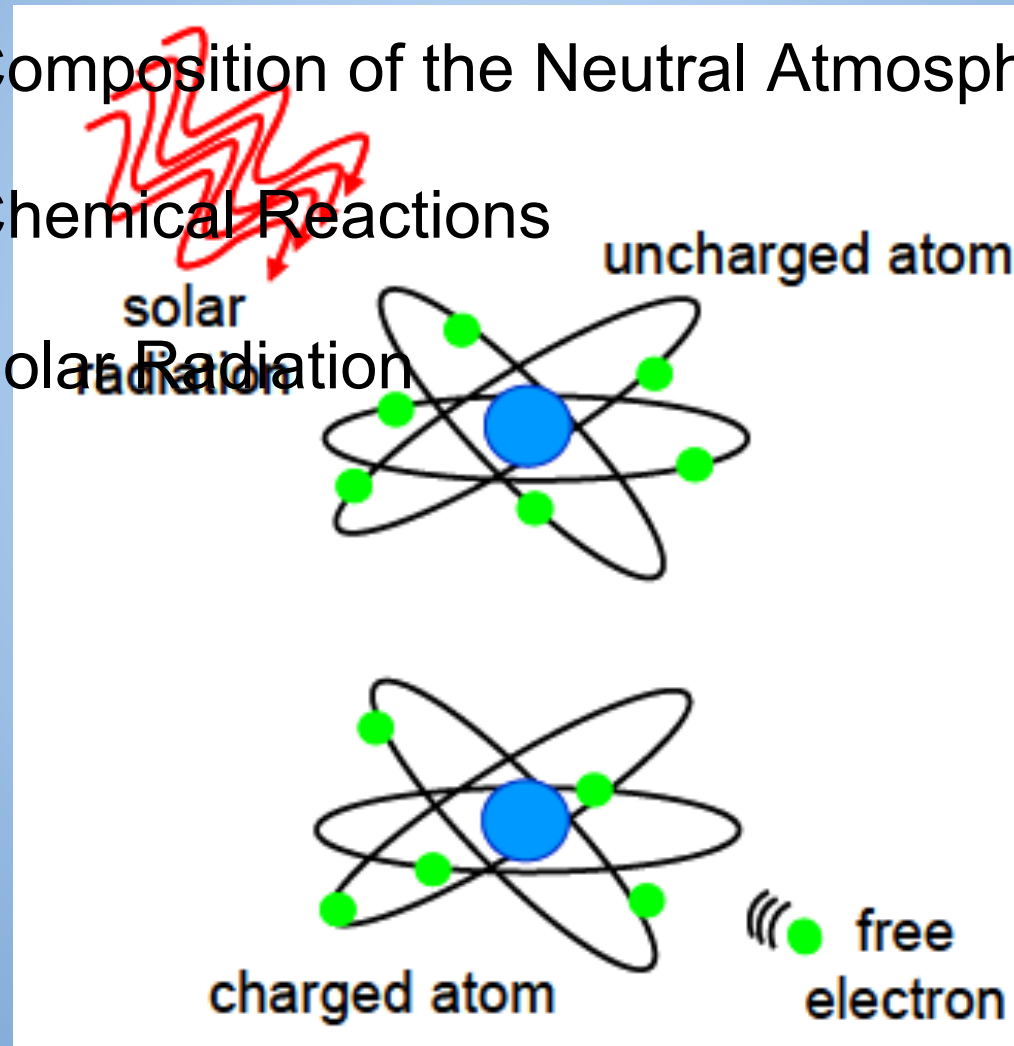




# Time Dependent Ionospheric Model

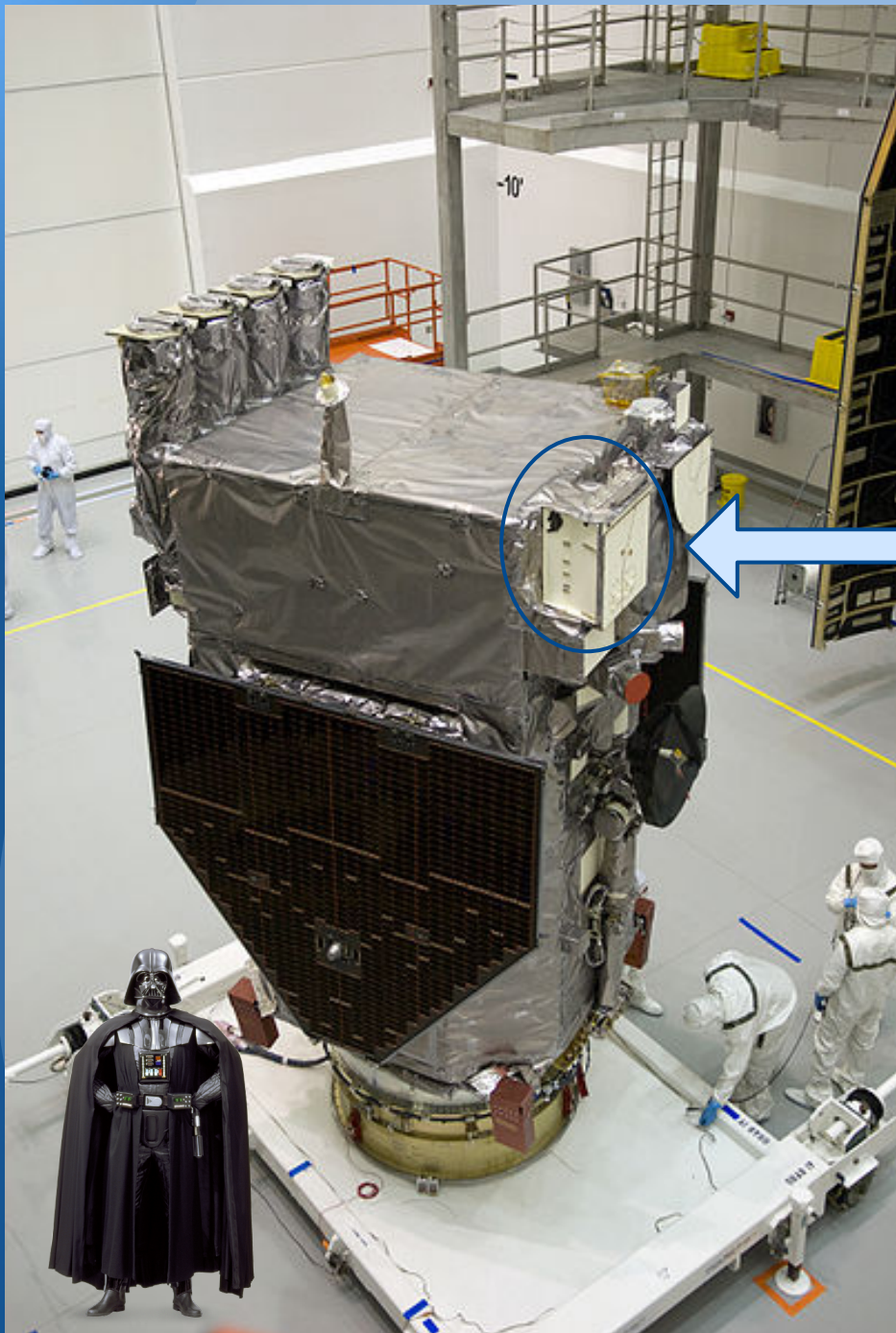
## Photoionization

- Composition of the Neutral Atmosphere
- Chemical Reactions
- Solar Radiation

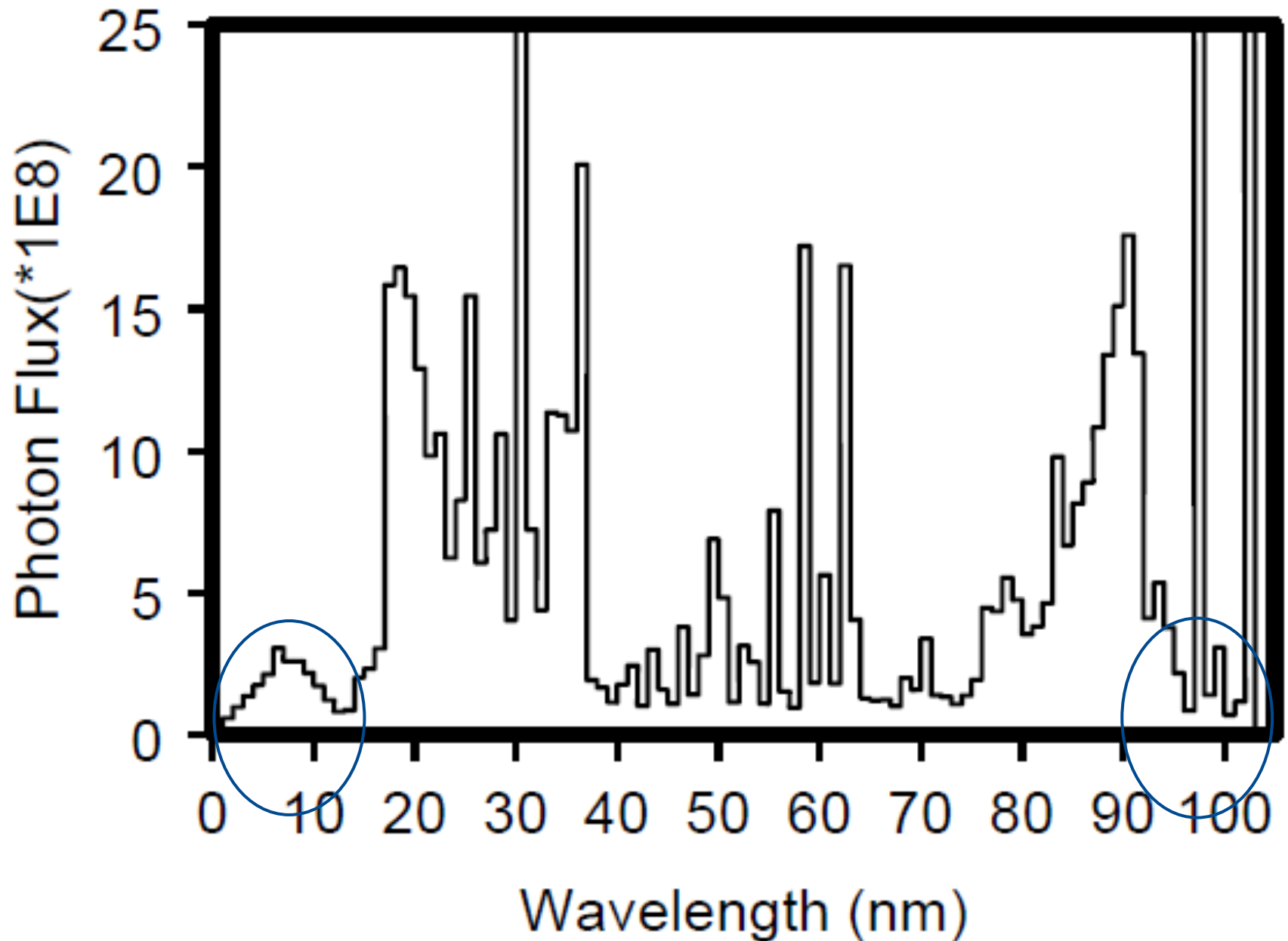


# The NASA Solar Dynamics Observatory (SDO)

Extreme Ultraviolet  
Variability Experiment (EVE)



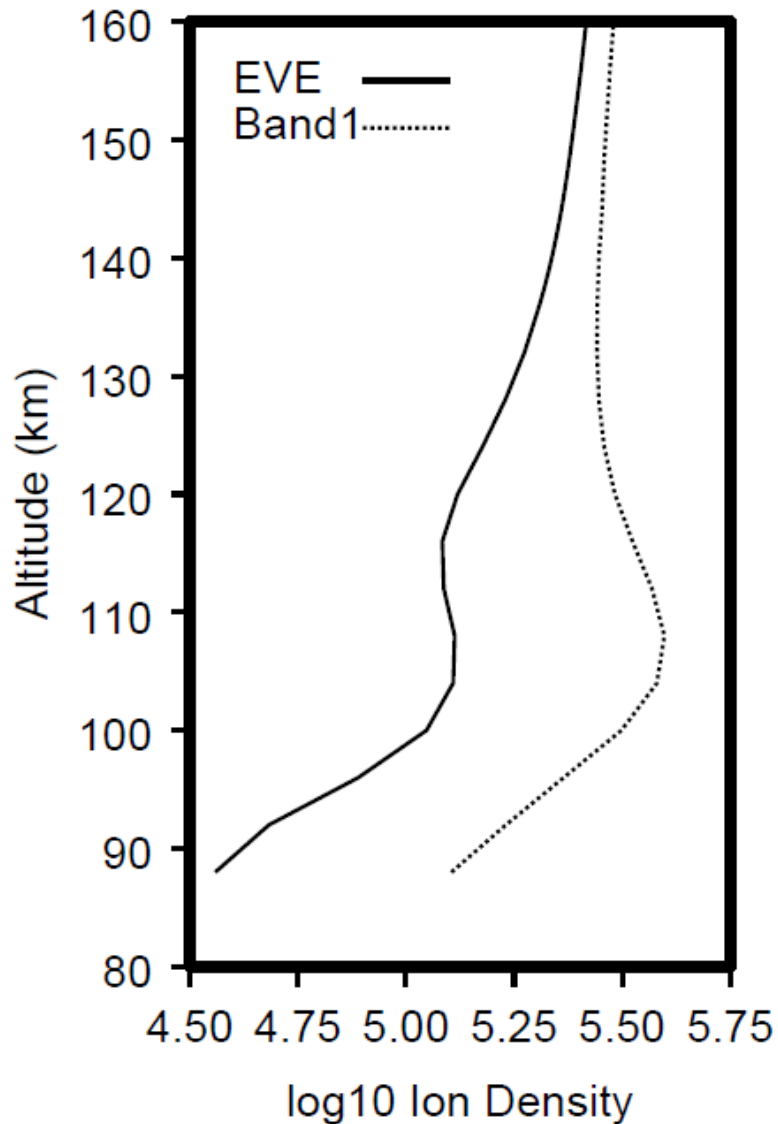
# A Typical EVE data set



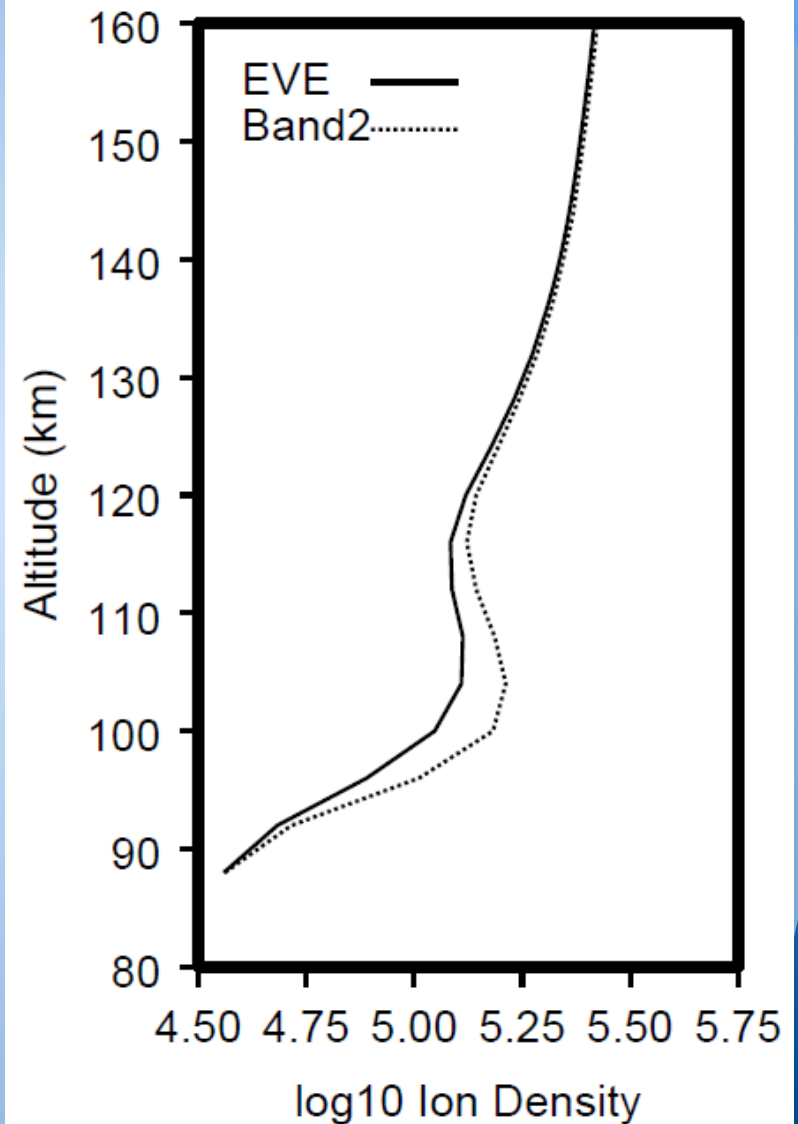


# Effects of Bands 1 and 2

## Band 1 Increased



## Band 2 Increased

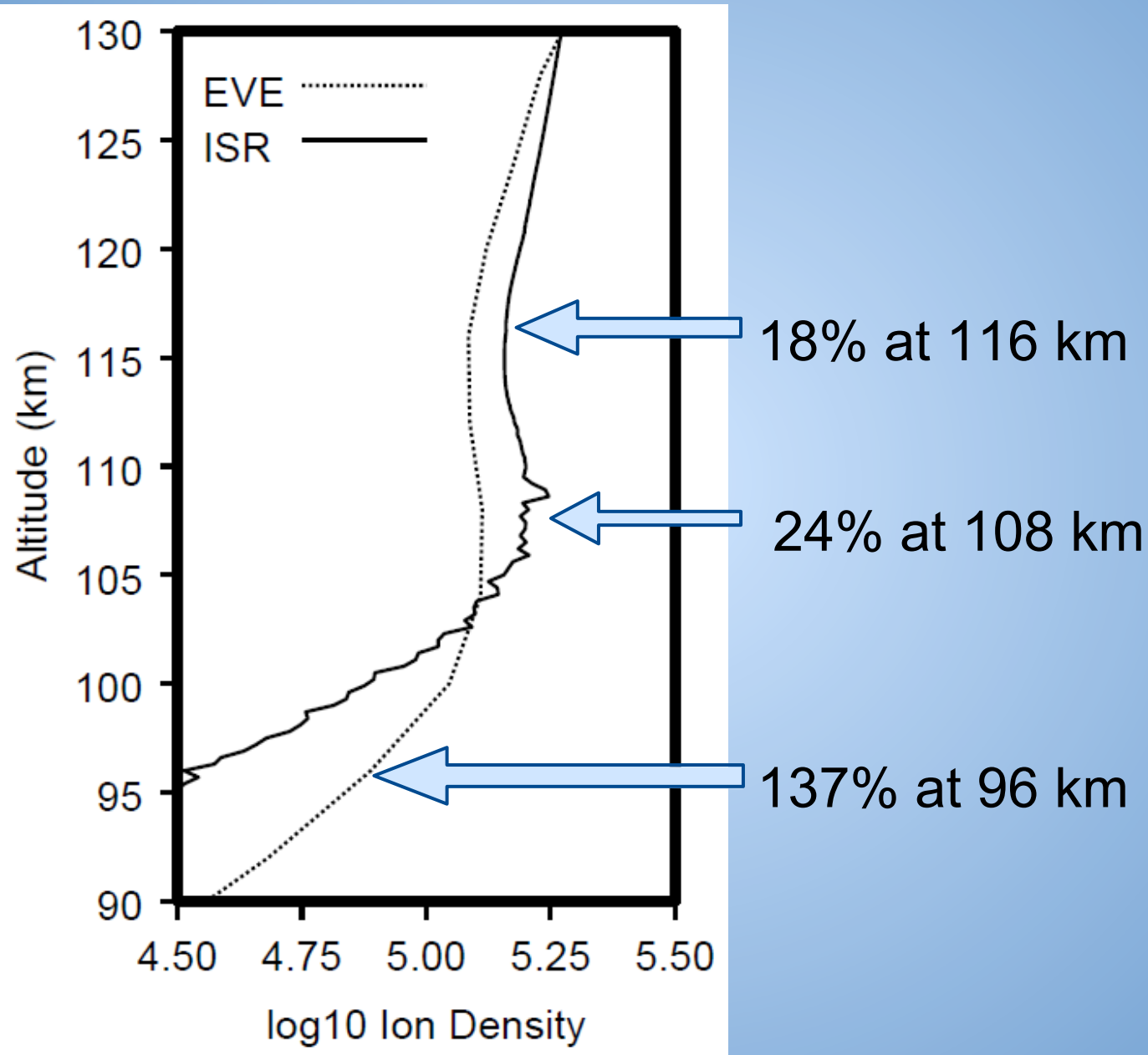


# Arecibo Incoherent Scatter Radar (ISR)





# Model Data vs. ISR Data



# Summary

- The E-region is important
- EVE has increased our knowledge of the solar radiation
- The two wavelength bands 0-15nm and 91-103nm are important for E-region generation
- ISR data important to model verification

## References:

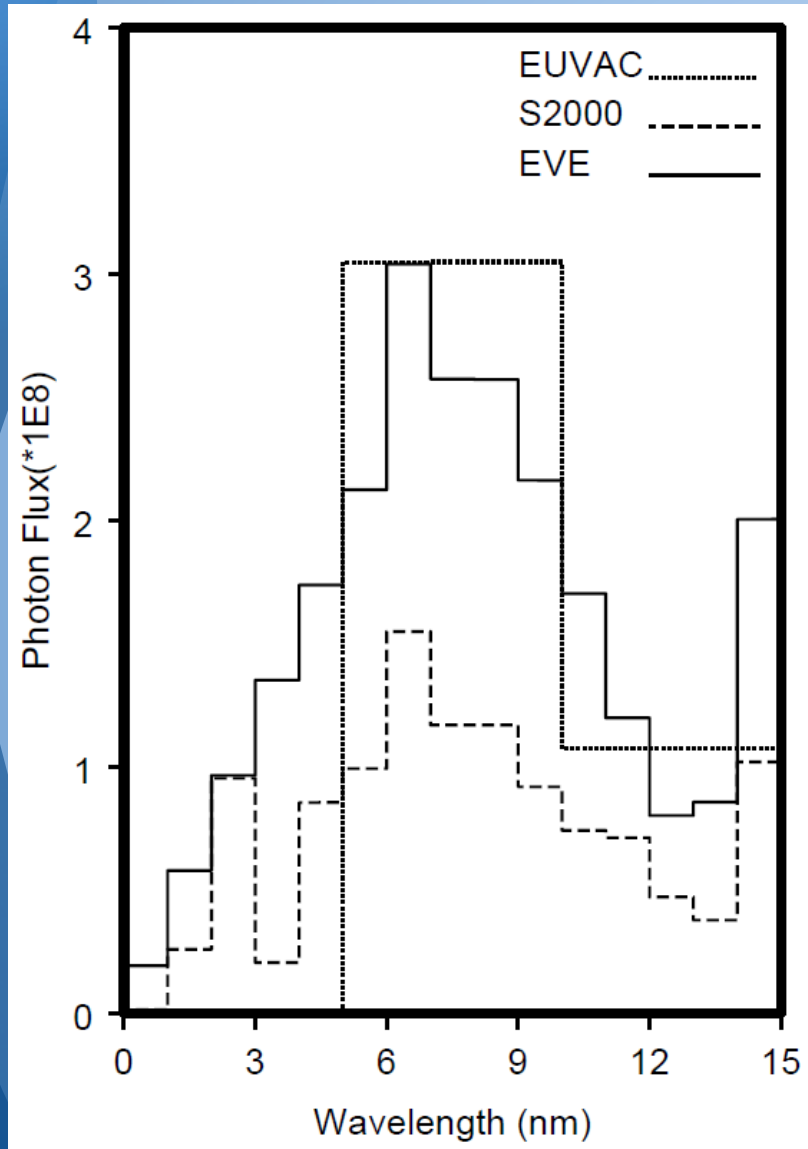
- Jan J. Sojka, Joseph Jensen, Michael David, and Robert W. Schunk, Tom Woods, Frank Eparvier. "Modeling the Ionospheric E- and F1 Regions: Using SDO EVE Observations as the Solar Irradiance Driver" Submitted to Journal of Geophysical Research, 1 March 2013,
- "Introduction to HF Radio Propagation" IPS Radio and Space Services, Australian Government <<http://www.ips.gov.au/Educational/5/2/2>>
- Wikipedia "Solar Dynamics Observatory", "Arecibo Observatory", "Magnetosphere", retrieved 8 April 2013, <[en.wikipedia.org/wiki/Arecibo\\_Observatory](http://en.wikipedia.org/wiki/Arecibo_Observatory)> <[http://en.wikipedia.org/wiki/Solar\\_Dynamics\\_Observatory](http://en.wikipedia.org/wiki/Solar_Dynamics_Observatory)>, <<http://en.wikipedia.org/wiki/Magnetosphere>>

some extra slides just in case

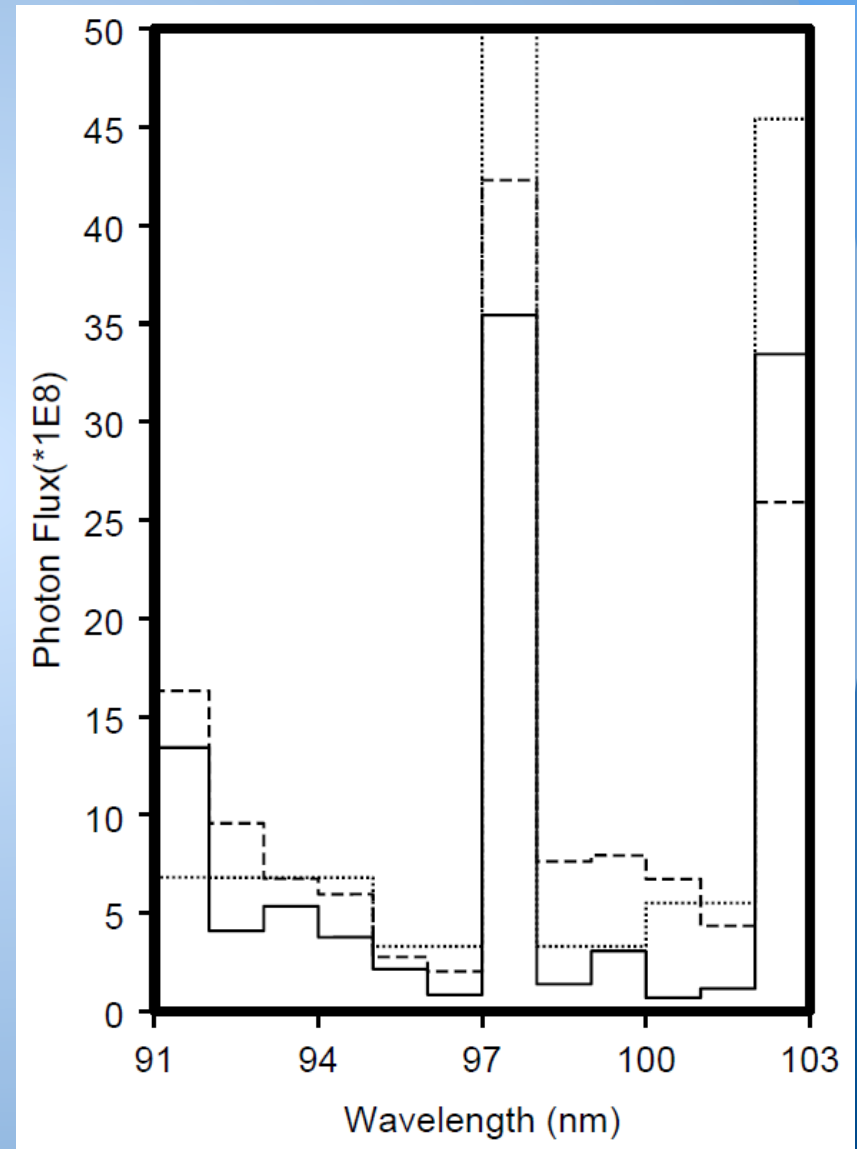


# EVE data compared with solar irradiance models

## Band 1

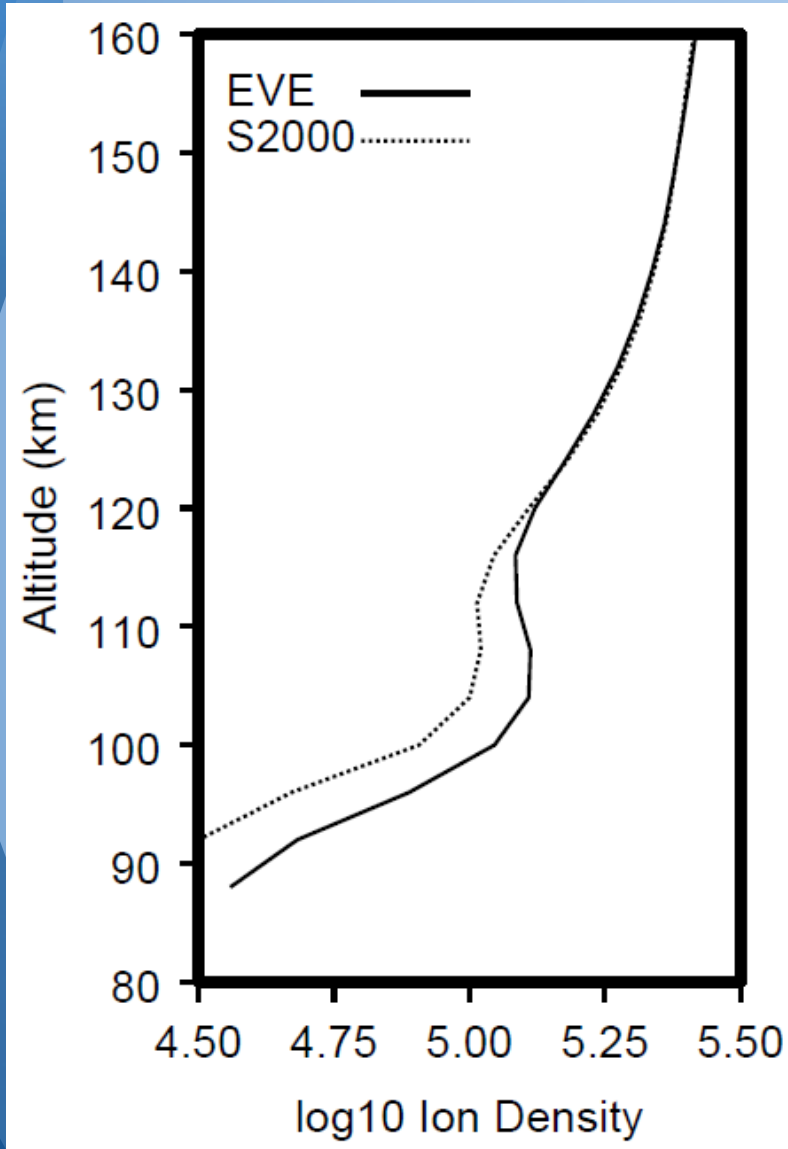


## Band 2

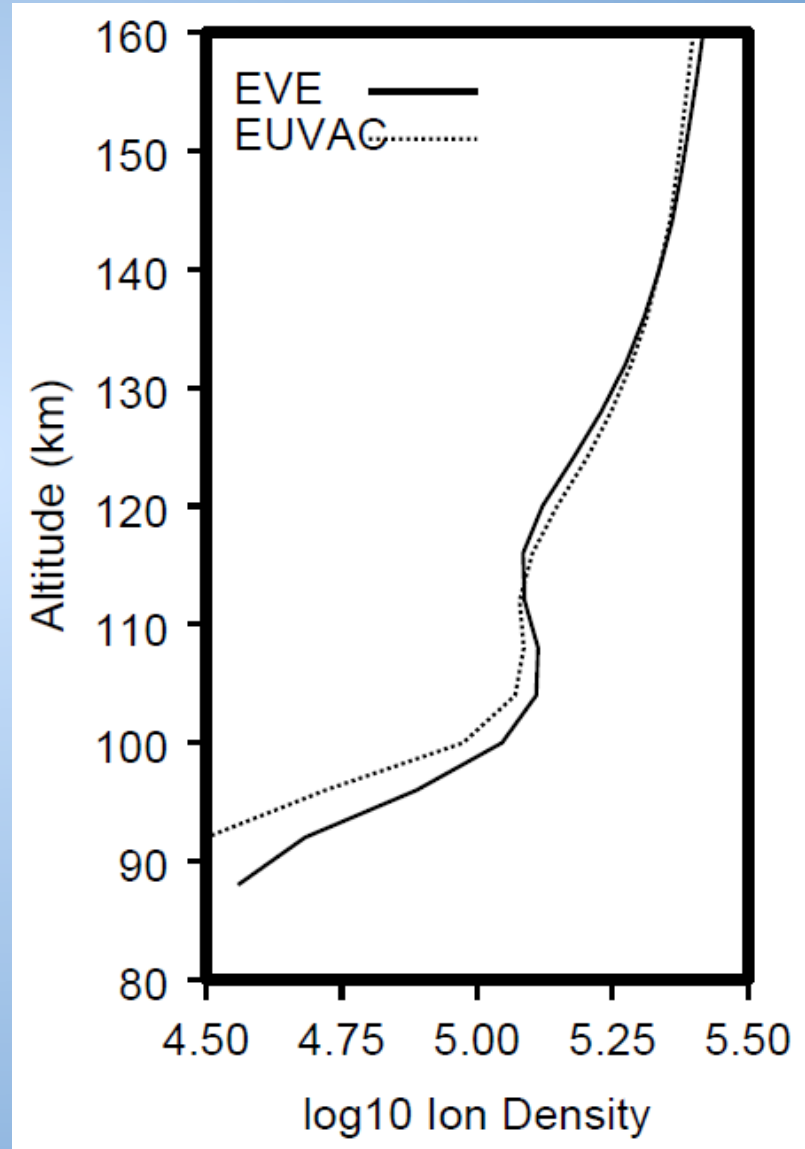


# EVE compared to S2000 and EUVAC

S2000

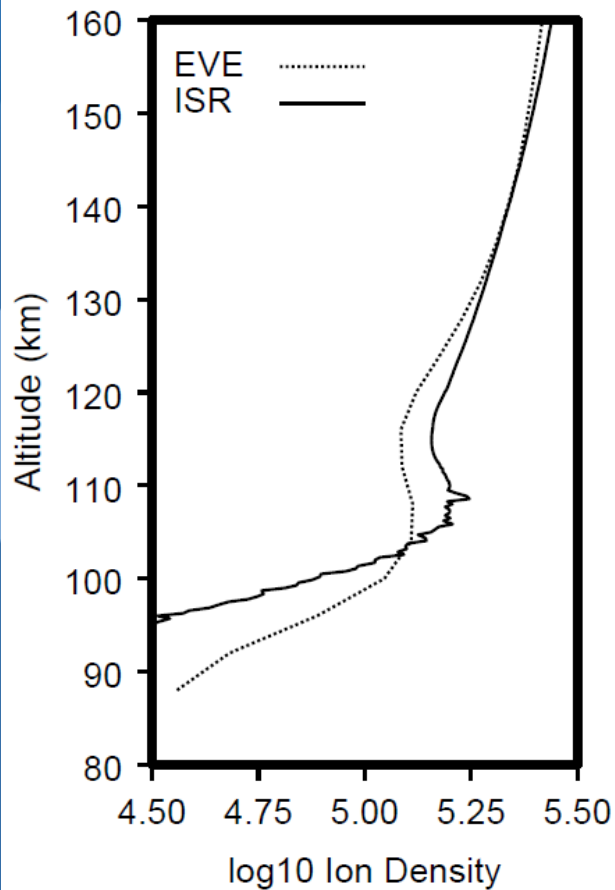


EUVAC

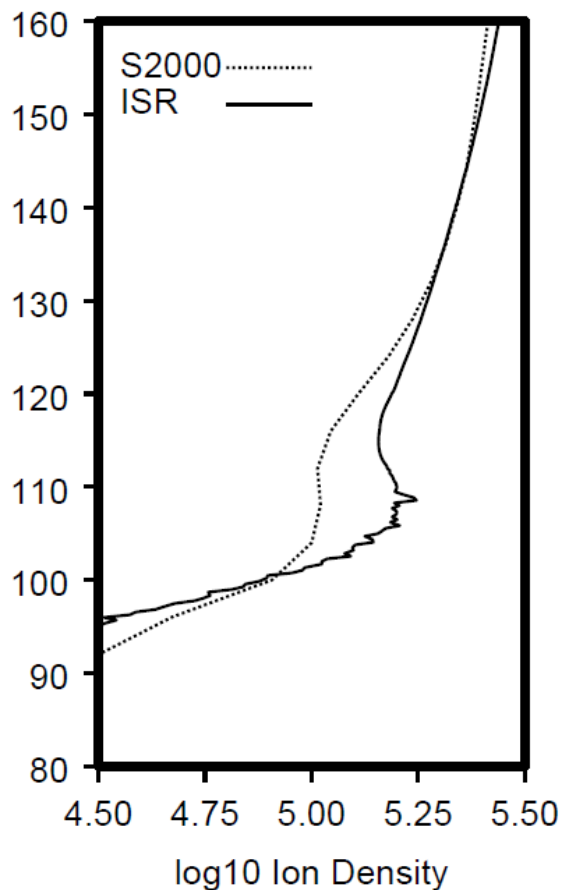


# Old Model Data vs. ISR

## EVE



## S2000



## EUVAC

